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(54) SUPERCONDUCTING GENERATOR

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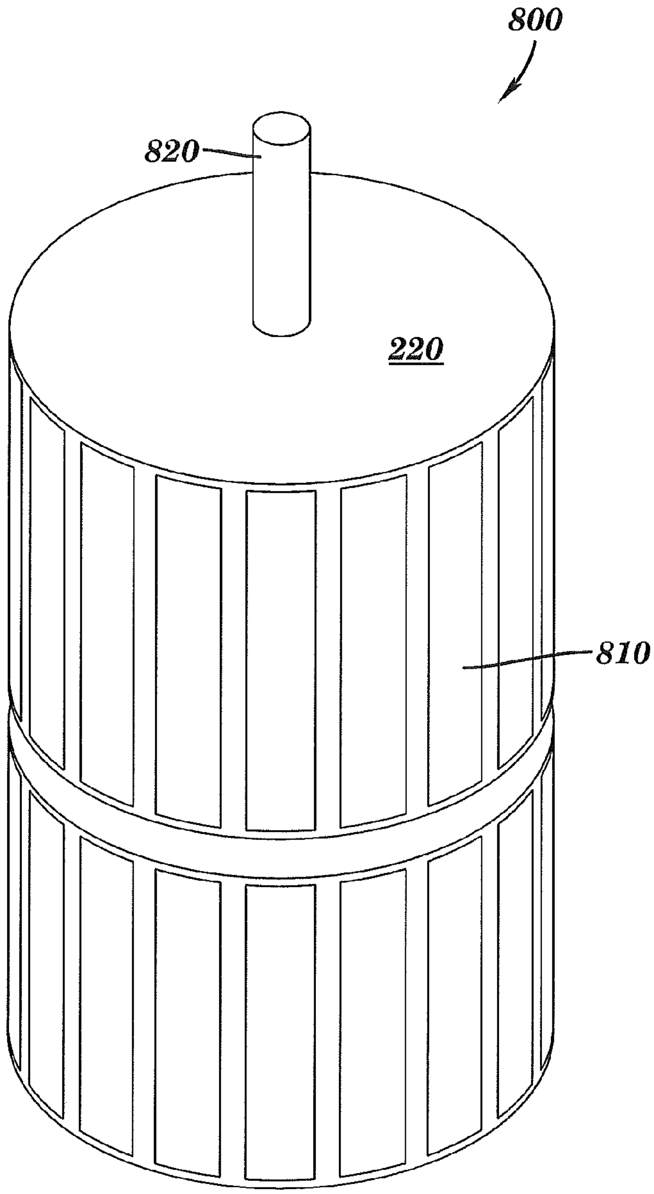
(57) **ABSTRACT**

A generator that comprises at least one ferromagnetic core including a gap, a magnet capable of producing a normal magnetic field within said gap and at least one coil positioned within the normal magnetic field on the core. At least one diamagnet that is positioned to pass through said gap on said core, wherein the diamagnet momentarily blocks the normal magnetic field causing a voltage to be induced within said coil.



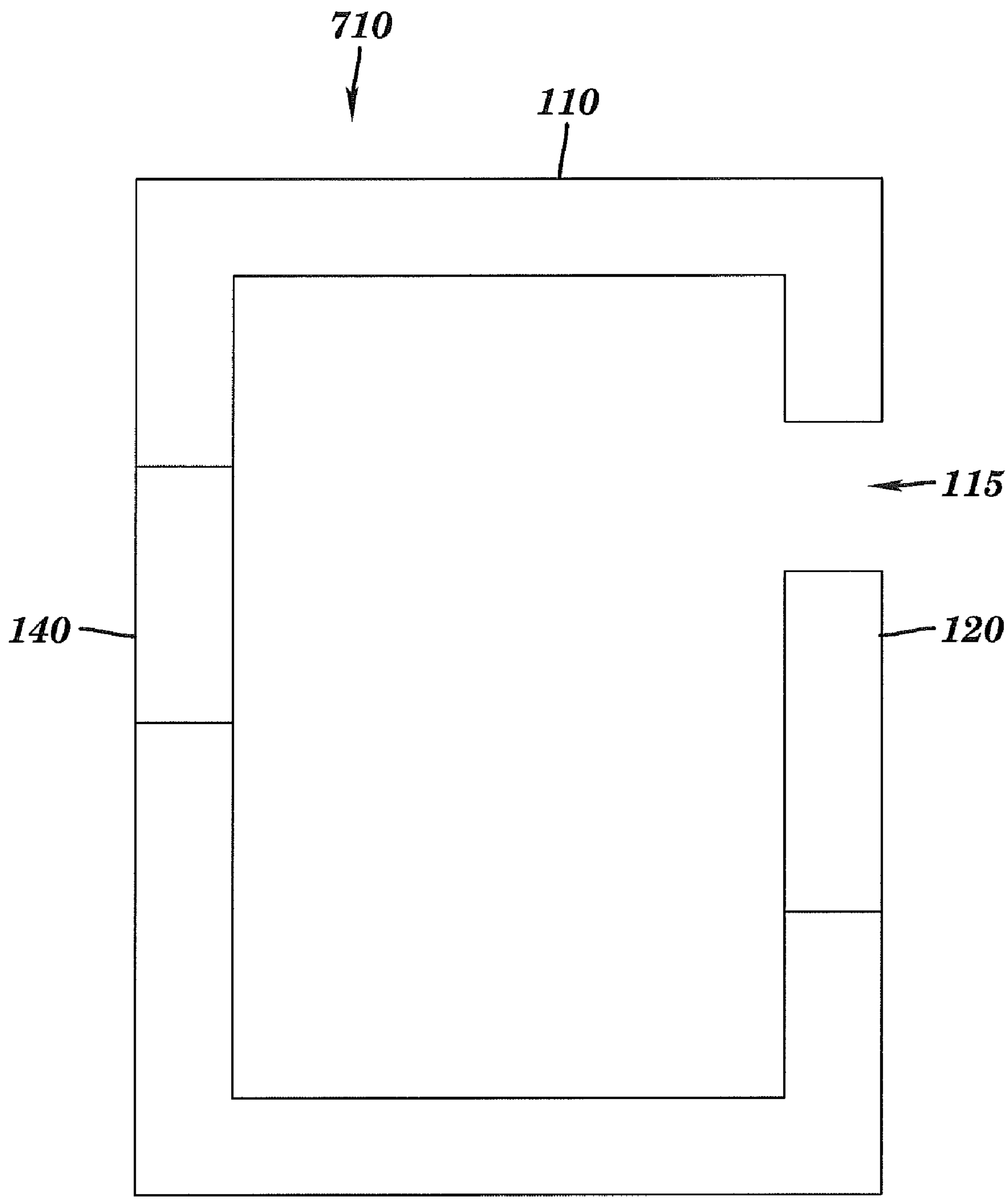


FIG. 1

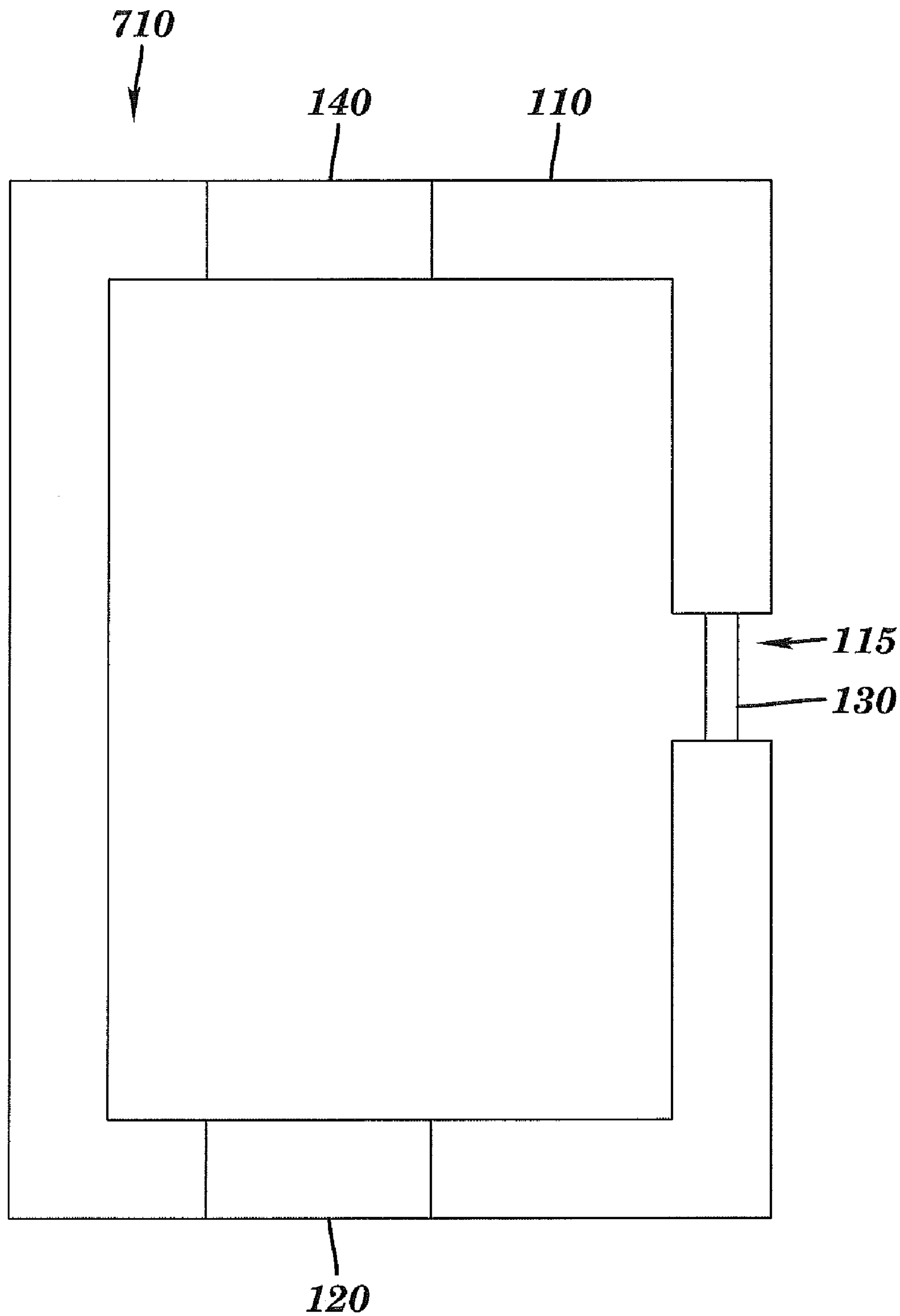


FIG. 2

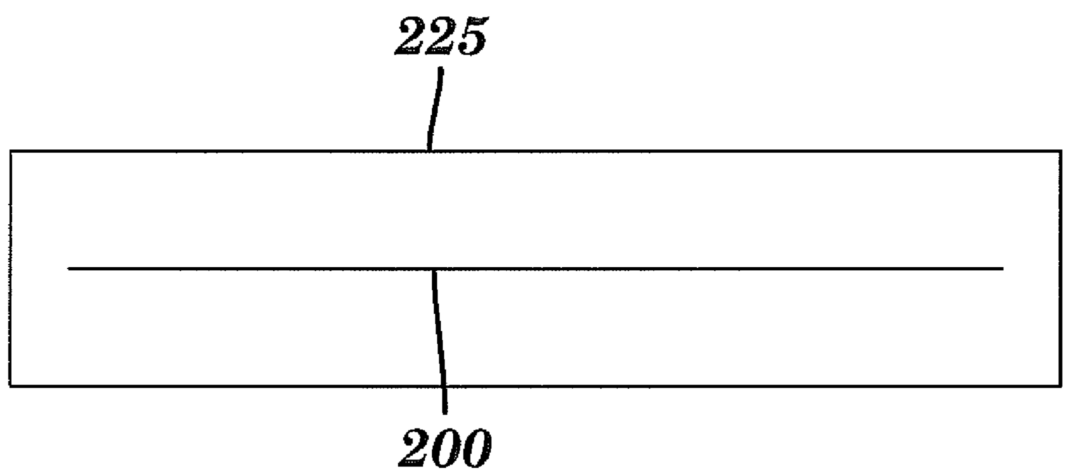


FIG. 3

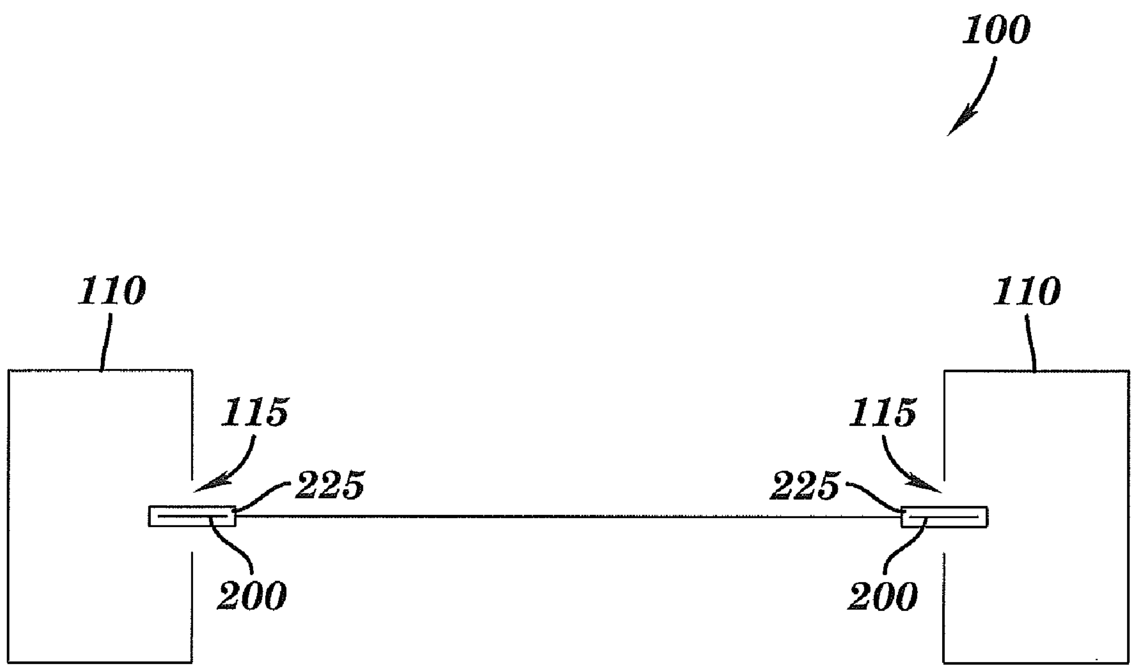


FIG. 4

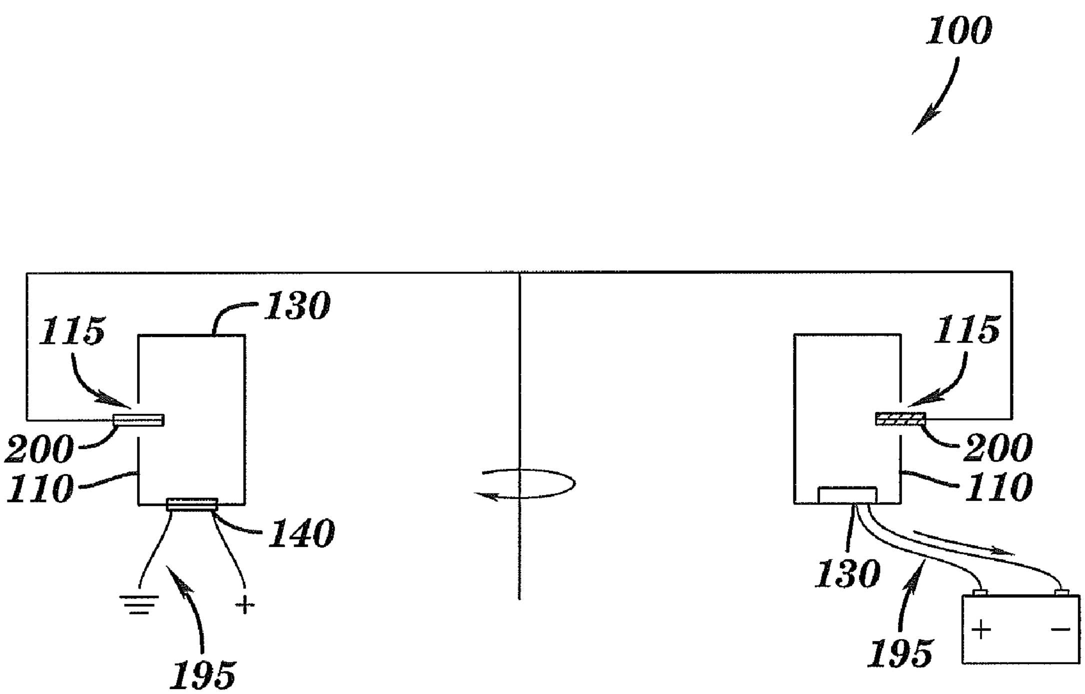


FIG. 5

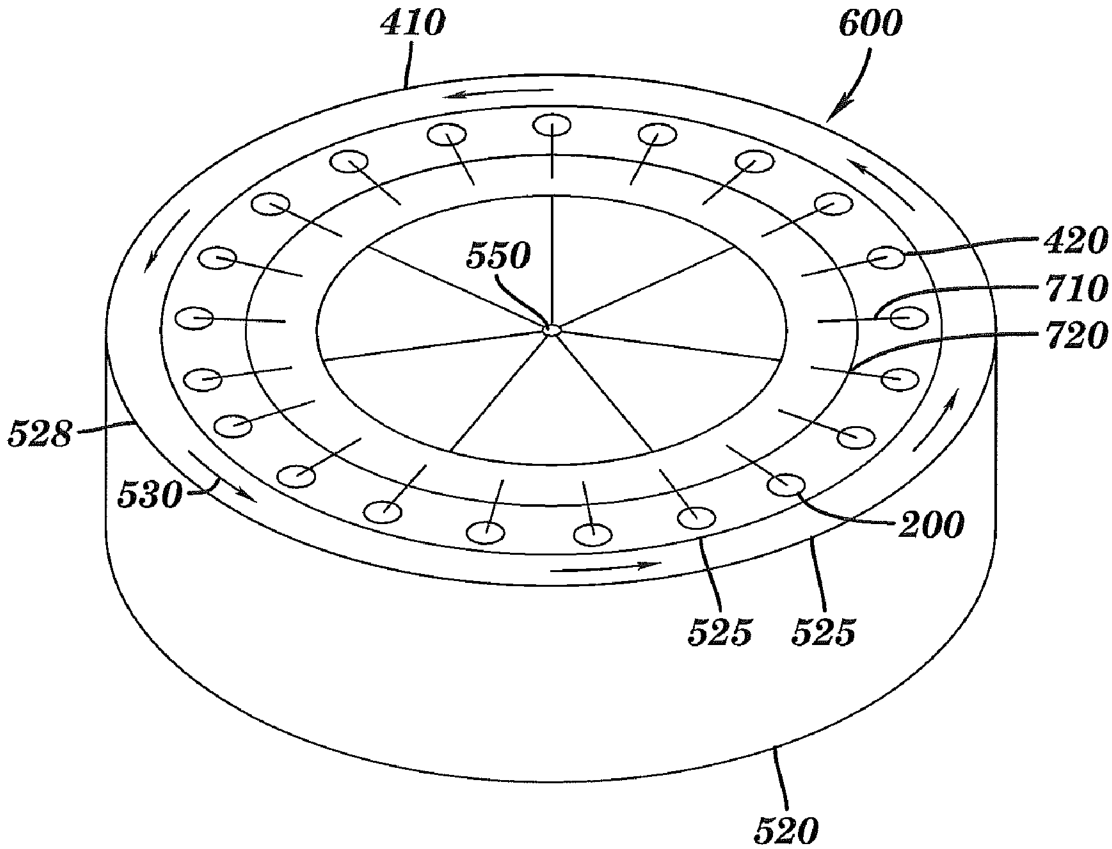


FIG. 6

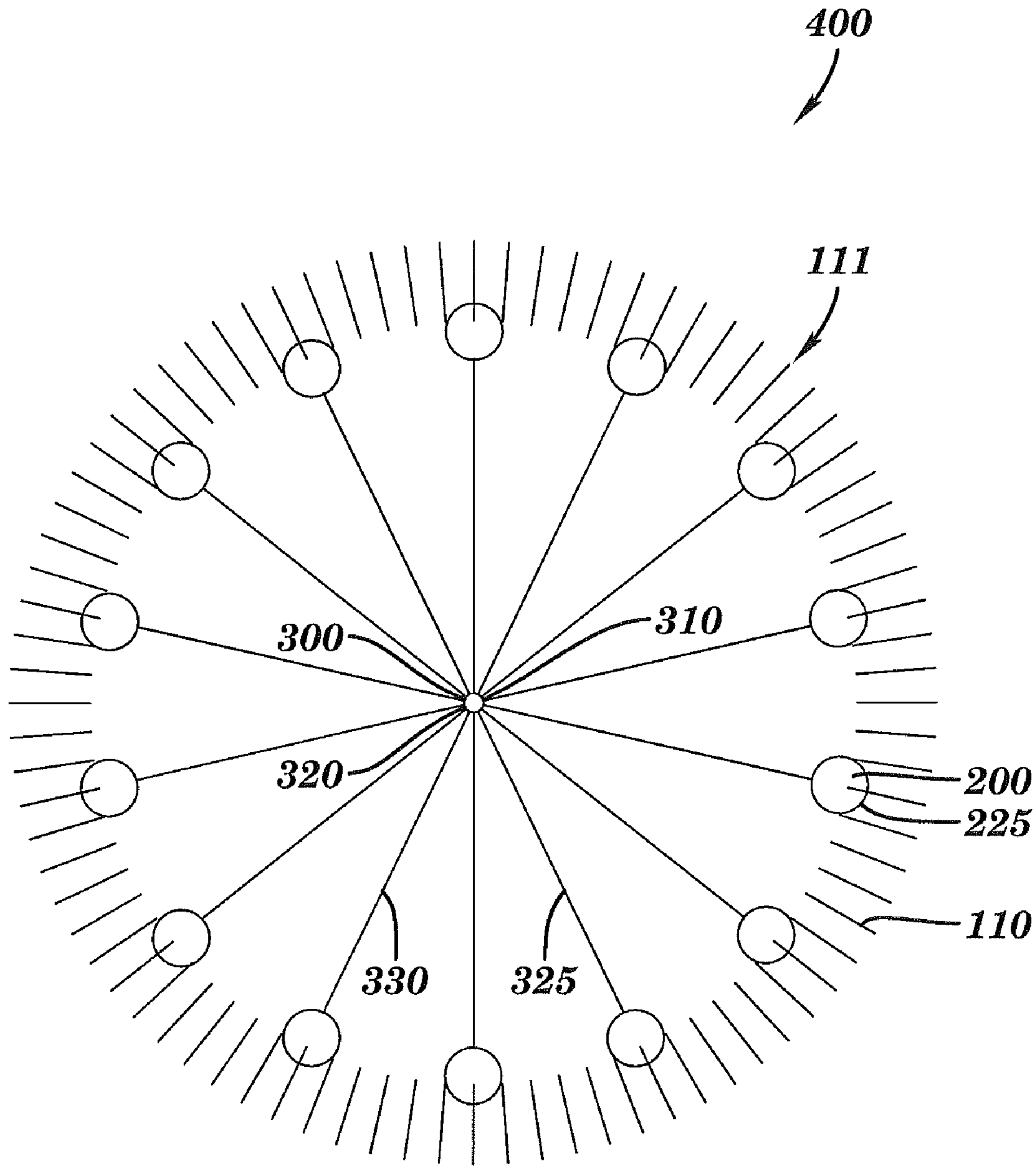


FIG. 7

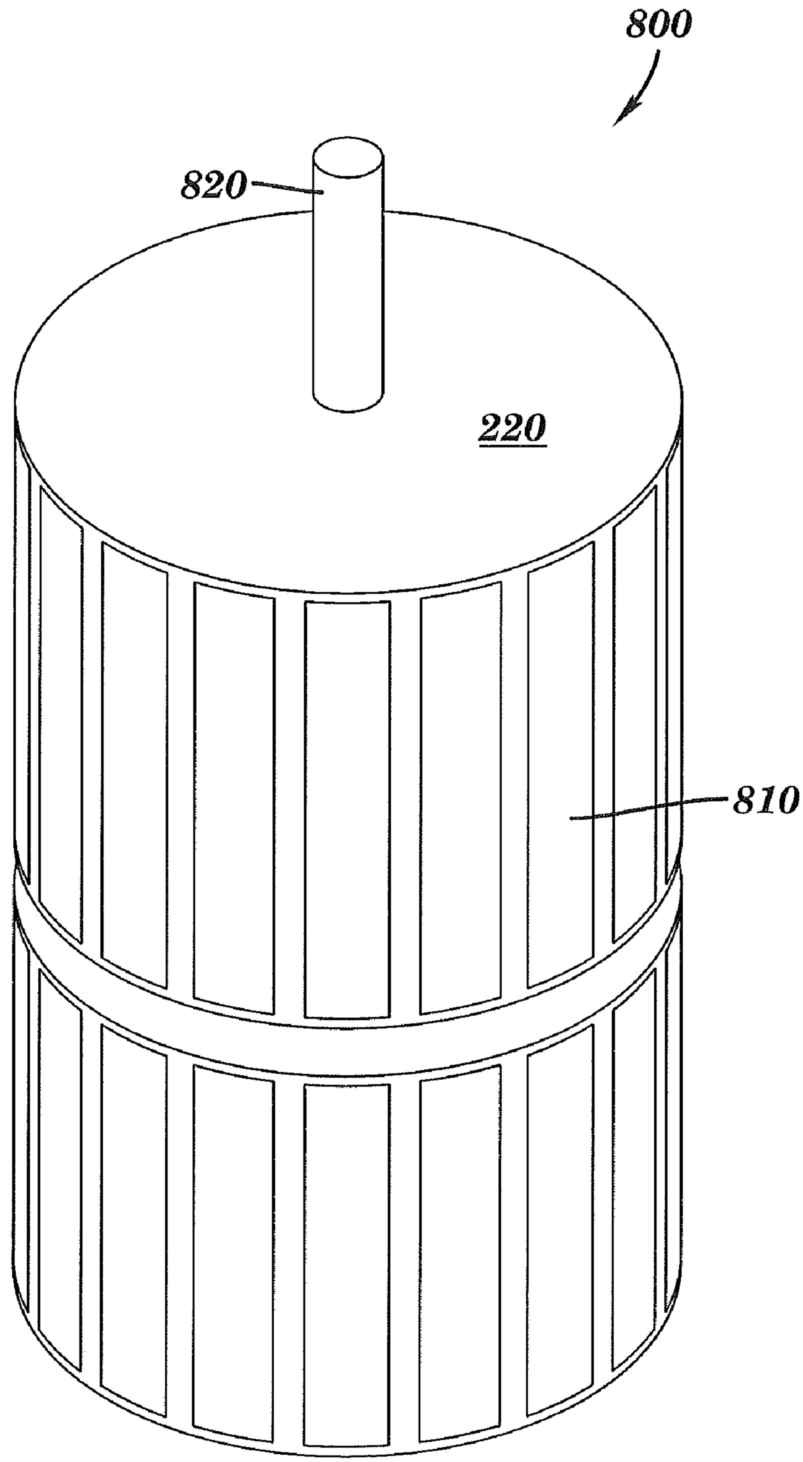


FIG. 8

SUPERCONDUCTING GENERATOR

BACKGROUND OF THE INVENTION

[0001] The invention relates to generators.

BRIEF SUMMARY OF THE INVENTION

[0002] A first embodiment of the invention is a generator comprising at least one ferromagnetic core including a gap; a magnet positioned on said at least one ferromagnetic core producing a normal magnetic field within said gap; at least one coil positioned within the normal magnetic field on said at least one ferromagnetic core; at least one diamagnet rotatably positioned to pass through said gap on said at least one ferromagnetic core, wherein rotation of said at least one diamagnet that momentarily blocks the normal magnetic field causing a voltage to be produced withing said at least one coil.

[0003] A second embodiment of the invention is a superconducting generator comprising: at least one rotatable ferromagnetic core including a gap; a magnet positioned on said at least one ferromagnetic core producing a normal magnetic field; a coil positioned within the field on said at least one ferromagnetic core; and at least one fixed superconducting diamagnet positioned to pass through said gap on said at least one ferromagnetic core when said core is rotated.

[0004] A third embodiment of the invention is a superconducting generator comprising: a plurality of ferromagnetic cores arranged in a circle, wherein each core includes a gap; a magnet positioned on each of said plurality of ferromagnetic cores producing a normal magnetic field within each said core and said gap; at least one coil positioned within the normal magnetic field on each said plurality of ferromagnetic cores; a plurality of superconducting diamagnet positioned and configured to pass through each said gap on said plurality of ferromagnetic cores, wherein rotation of either said plurality of superconducting diamagnets or plurality of ferromagnetic cores with respect to each other momentarily blocks the normal magnetic field causing a voltage to be produced withing said at least one coil.

BRIEF DESCRIPTION OF THE DRAWINGS

[0005] Some of the embodiments of this invention will be described in detail, with reference to the following figures, wherein like designations denote like members, wherein:

[0006] FIG. **1** depicts a side view of the core;

[0007] FIG. **2** depicts a side view of a second embodiment of the core;

[0008] FIG. **3** depicts a diamagnetic superconductor that is optionally encased with a dewar;

[0009] FIG. **4** depicts a plurality of cores with a centrally facing gap and a plurality rotated superconductor;

[0010] FIG. **5** depicts a plurality of rotating cores with an externally facing gap and a plurality of externally mounted fixed diamagnets;

[0011] FIG. **6** depicts a top view of a plurality of cores arranged in a circular pattern that are rotated to move fixed diamagnets within that gap;

[0012] FIG. **7** depicts a top view of a plurality of diamagnets rotated within a circular formation of inwardly facing cores; and

[0013] FIG. **8** depicts a side view of a stacked circular arrangement of cores and diamagnets.

DETAILED DESCRIPTION OF THE INVENTION

[0014] Although certain preferred embodiments of the present invention will be shown and described in detail, it should be understood that various changes and modifications may be made without departing from the scope of the appended claims. The scope of the present invention will in no way be limited to the number of constituting components, the materials thereof, the shapes thereof, the relative arrangement thereof, etc., and are disclosed simply as an example of an embodiment. The features and advantages of the present invention are illustrated in detail in the accompanying drawings, wherein like reference numerals refer to like elements throughout the drawings.

[0015] As a preface to the detailed description, it should be noted that, as used in this specification and the appended claims, the singular forms "a", "an" and "the" include plural referents, unless the context clearly dictates otherwise. In the invention a diamagnet **200**, which may be from a superconducting material, acts as a blocking device that moves with respect to a gap **115** in a core **110** having a magnetic field **130** that includes a coil **140**, wherein the diamagnet **200** periodically shields and unshields the magnetic field **130** inducing an EMF (Electro Motive Force) generating a voltage or current **195** from the coil **140**. The invention provides for the efficient transformation of the energy of the magnetic field **130** into electrical energy from movement of the diamagnet **200** with respect to the gap **115** in the core **110**.

[0016] Faraday's Law states that the induced emf around a closed mathematical path in a magnetic field is equal to the rate of change of magnetic flux intercepted by the area within the path. Inefficient systems can use large amounts of energy to change the magnetic flux and produce the electromotive force while more efficient methods for changing the flux may be used to produce the same electromotive force for far less energy. Thus, the efficiency in the production of the emf is a product of the efficiency in changing the magnetic flux which passes through the closed circuit.

[0017] The blocking of the magnetic field **130** in the core **110** occurs when a diamagnetic object passes through the gap **115**, where the diamagnetism is caused by the Meissner effect of superconductive materials (i.e., the diamagnetic properties of a superconductive material **200** may occur in specific materials when operating at a temperature below its transition temperature) that are exploited to provide a device **100** for producing electrical energy from a magnetic field **130**. A superconductive element **200**, either a high temperature or low temperature type, is maintained at a temperature immediately below its transition temperature or colder and periodically it acts to shield a coil **140** from a magnetic field established by a permanent or electromagnet **120** causing a changing flux within the coil **140** to induce and EMF.

[0018] A ferromagnetic core **110** is used that has suitable properties to establish a magnetic field **130** within its body with a magnet **20**. The core **110** may be a circular or closed geometric shape, such as a square to allow a continuous magnetic field to be guided. The core **110** can also be made of electrical steel, also called lamination steel, silicon electrical steel, silicon steel or transformer steel, all of which are specialty steels tailored to produce certain magnetic properties, such as a small hysteresis area (small energy dissipation per cycle, or low core loss) and high permeability. The core material **110** may be manufactured in the form of cold-rolled strips less than 2 nm thick called laminations that may form a core **110** when stacked together. Laminations may be cut to their finished shape by a punch and die, or in smaller quantities may be cut by a laser. The core **110** of the instant invention may be shaped in any manner that allows a magnetic loop **130** to be formed within and across the gap **115**.

[0019] A coil **140** induces an EMF in response to the magnetic field **130** that passes through a gap **115** within the core **110** that is temporarily blocked or disrupted when a diamagnet **200** is interposed between the field of the magnet **120** and the coil **140** by passing within the gap **115** of the core **110**. The magnetic field **130** within the core **110** can be from either a permanent or electromagnet **120**. The diamagnet **200** is a magnetic flux shielding device that moves with respect to the gap **115** in the core **110** to alternately shield and unshield the magnetic flux from the coil **140**. The core **110** as discussed above may be made of a ferro-magnetic material such as transformer steel or the like which would enclose and confine the field of the magnet dipole **120** to ensure that it passes through the gap **115**. The invention is not effected by the position of the coil **140** and magnet **120**, which may be placed anywhere upon the core **110**.

[0020] A superconducting generator **100** of the invention comprises at least one ferromagnetic core **110** including a gap **115** having a magnet **120** positioned on the ferromagnetic core **110** producing a normal magnetic field **130** within said gap **115** and at least one coil **140** positioned within the normal magnetic field **130** on said at least one ferromagnetic core **110** as shown in FIGS. **1** and **2**. The superconductor generator **100** includes at least one superconducting diamagnet **200** that is rotatably positioned adjacent to said core **110** to allow the diamagnet **200** to pass through said gap **115** as shown in FIG. **4**. An EMF is induced in the coil **140** on the ferromagnetic core **110** when rotation of said at least one superconducting diamagnet **200** momentarily blocks the normal magnetic field **130** causing a changing magnetic flux within at least one coil **140**.

[0021] The blocking device **200** must be kept below the transition temperature of the specific superconducting material used, either type I or type II or the Meisner effect is temporarily destroyed removing the properties of diamagnetism and therefore preventing blocking of the magnetic field **130** passing through the gap **115**. One solution to maintain diamagnetism properties of the superconductor is to cool the whole superconducting apparatus **100** including the core **110**, magnet **120** and coil **140** along with the diamagnet **200** and all attached assemblies below the superconducting material's critical temperature used in the application. Another option is by having the superconducting generator **100** further comprise, as shown in FIG. **3**, a dewar **225** surrounding said superconducting diamagnet **200**, said dewar **225** is dimensioned to pass through the gap **115** on the core **110**. The use of a dewar **225** dimensioned to pass within the gap **115** of the core **110** allows for cooling only of the diamagnetic material **200** and the remaining constituents of the generator **100** remain at a more economically desirable temperature above the critical temperature of the superconductor **200** that is desirable from the standpoint of cooling costs and storage requirements.

[0022] A superconductor placed in a weak external magnetic field H **130** permits the field **130** to penetrate the superconductor a short distance called the London penetration depth before it decays rapidly to zero (blocked), which is called the Meissner effect, and is a defining characteristic of superconductivity. The Meissner effect is different than the diamagnetism in a perfect electrical conductor that according to Lenz's law, when a changing magnetic field is applied to a conductor, it will induce an electrical current in the conductor that creates an opposing magnetic field. In a perfect conductor, an arbitrarily large current can be induced, and the resulting magnetic field exactly cancels the applied field.

[0023] The Meissner effect is distinct from this because a superconductor expels all magnetic fields, not just those that are changing. Suppose we have a material in its normal state, containing a constant internal magnetic field that when the material is cooled below the critical temperature (Tc), we would observe the abrupt expulsion of the internal magnetic field, which we would not expect based on Lenz's law.

[0024] The Meissner effect breaks down when the applied magnetic field **130** is too large and thus ceases to be able to function as a diamagnet. Type I superconductors may be abruptly destroyed (superconductivity) when the strength of the applied field rises above a critical value Hc. Depending on the defects and flux pinning of the sample, one may obtain an intermediate state consisting of regions of normal material carrying a magnetic field mixed with regions of superconducting material containing no field. In Type II superconductors, raising the applied field past a critical value H_{c1} leads to a mixed state in which an increasing amount of magnetic flux penetrates the material, but there remains no resistance to the flow of electrical current as long as the current is not too large. At a second critical field strength Hc2, superconductivity is destroyed because the mixed state is actually caused by vortices in the electronic superfluid, sometimes called fluxons because the flux carried by these vortices is quantized. Therefore, the magnetic field **130** in the core **110** of the generator **100** must use a magnetic source **120** weaker than Hc with Type 1 superconductors and weaker than H_{c1} for Type 2 superconductors.

[0025] The diamagnet of the invention may be a type 1 superconductors that may require the coldest temperatures to become superconductive and are elemental and very pure in nature. The type 1 superconductors listed below exhibit a very sharp transition to a superconducting state and a "perfect" diamagnetism the ability to repel a magnetic field completely. The instant invention may use the Type 1 superconductor Niobium (Nb) that below a temperature of 8K has an Hc of about 2,000 gauss, which has the highest Hc of the currently known type 1 and type 2 superconductors.

[0026] Below is a list of other known Type 1 superconductors along with their critical transition temperature (known as Tc) below which each superconducts. Lead (Pb) 7.196 K; Lanthanum (La) 4.88 K; Tantalum (Ta) 4.47 K; Mercury (Hg) 4.15 K; Tin (Sn) 3.72 K; Indium (In) 3.41 K; Palladium (Pd)* 3.3 K; Chromium (Cr)* 3 K; Thallium (Tl) 2.38 K; Rhenium (Re) 1.697 K; Protactinium (Pa) 1.40 K; Thorium (Th) 1.38 K; Aluminum (Al) 1.175 K; Gallium (Ga)1.083 K; Molybdenum (Mo) 0.915 K; Zinc (Zn) 0.85 K; Osmium (Os)0.66 K; Zirconium (Zr)0.61 K; Americium (Am) 0.60 K; Cadmium (Cd) 0.517 K; Ruthenium (Ru) 0.49 K; Titanium (Ti) 0.40 K; Uranium (U)0.20 K; Hafnium (Hf)0.128 K; Iridium (Ir) 0.1125 K; Beryllium (Be)0.023 K (SRM 768); Tungsten (W)0.0154 K; Platinum (Pt)* 0.0019 K; Lithium (Li)0.0004 K; Rhodium (Rh) 0.000325K

[0027] The next superconducter possible to use is a Type 2 category of superconductors that includes metallic compounds and alloys. The highest Tc attained at ambient pressure for a material that will form stoichiometrically (by formula) has been 138 K and a patent has been applied for a 150K material which does not form stoichiometrically (see below list). Type 2 superconductors differ from Type 1 in that their transition from a normal to a superconducting state is gradual across a region of "mixed state" behavior. A Type 2 will allow some penetration by an external magnetic field into its surface. While there are far too many known to one skilled in the art to list in totality, some of the more interesting Type 2 superconductors are listed below by similarity and with descending Tc's

[0028] One skilled in the art would naturally substitute a later discovered type 2 superconductor having superior properties and higher Tc and should be considered as an equivalent. While type 2 superconductors known currently have a much higher Tc than type 1 superconductors the critical magnetic field is an order of magnitude smaller at about 200 gauss than Niobium (Nb) having 2,000 gauss, which directly impacts the amount of current generated by each coil **140** on each core **110**.

[0029] A partial list of suitable type 2 superconductors than may be used is as follows: $InSnBa_4Tm_4Cu_6O_{18+}$~150 K; $(Hg_{0.8}Tl_{0.2})Ba_2Ca_2Cu_{38.33}$138K; $HgBa_2Ca_2Cu_3O_8$ 133-135K; $HgBa_2Ca_3Cu_4O_{10+}$ 125-126K; $HgBa_2(Ca_{1-x}Sr_x)Cu_2O_{6+}$ 123-125K; $HgBa_2CuO_{4+}$ 94-98K; $Tl_2Ba_2Ca_2Cu_3O_{10}$ 127-128K; $(Tl_{1.6}Hg_{0.4})Ba_2Ca_2Cu_3O_{10+}$ 123K; $TlBa_2Ca_2Cu_3O_{9+}$ 118-120K; $(Tl_{0.5}Pb_{0.5})Sr_2Ca_2Cu_3O_9$ 118K; $Tl_2Ba_2CaCu_2O_6$ 115K; $(Tl_{0.5}Sn_{0.5})Ba_2(Ca_{0.5}Tm_{0.5})Cu_2O_x$ 112K; $TlBa_2Ca_3Cu_4O_{11}$ 103K; $TlBa_2CaCu_2O_{7+}$ 95K; $Sn_2Ba_2(Ca_{0.5}Tm_{0.5})Cu_3O_{8+}$ 115K; $SnInBa_4Tm_3Cu_5O_x$ 113K; $Sn_3Ba_4Tm_3Cu_6O_x$ 109K; $Sn_3Ba_8Ca_4Cu_{11}O_x$ 109K; $SnBa_4Y_2Cu_5O_x$ 105K; $Sn_4Ba_4Tm_2YCu_7O_x$ 104K; $Sn_4Ba_4CaTmCu_4O_x$ 100K; $Sn_4Ba_4Tm_3Cu_7O_x$ 98K; $Sn_2Ba_2(Y_{0.5}Tm_{0.5})Cu_3O_{8+}$ 96K; $Sn_3Ba_4Y_2Cu_5O_x$ 91K; $SnInBa_4Tm_4Cu_6O_x$ 87K; $Sn_2Ba_2(Sr_{0.5}Y_{0.5})Cu_3O_8$ 80K; $Sn_4Ba_4Y_3Cu_7O_x$ 80K; $Bi_{1.6}Pb_{0.6}Sr_2Ca_2Sb_{0.1}Cu_3O_y$ 115K; $Bi_2Sr_2Ca_2Cu_3O_{10}$ 110K; $Bi_2Sr_2CaCu_2O_9$ 110K; $Bi_2Sr_2(Ca_{0.8}Y_{0.2})Cu_2O_8$ 95-96K; $Bi_2Sr_2CaCu_2O_8$ 91-92K; $(Ca_{1-x}Sr_x)CuO_2$ 110K; $YSrCa_2Cu_4O_{8+}$ 101K; (Ba,Sr)CuO_2 90K; $BaSr_2CaCu_4O_{8+}$ 90K; (La,Sr)CuO_2 42K; $Pb_3Sr_4Ca_3Cu_6O_x$ 106K; $Pb_3Sr_4Ca_2Cu_5O_{15+}$ 101K; $(Pb_{1.5}Sn_{1.5})Sr_4Ca_2Cu_5O_{15+}$ 95K; $Pb_2Sr_2(Ca,Y)Cu_3O_8$ 70K; $AuBa_2Ca_3Cu_4O_{11}$ 99K; $AuBa_2(Y,Ca)Cu_2O_7$ 82K; $AuBa_2Ca_2Cu_3O_9$ 30K; $(Y_{0.5}Lu_{0.5})Ba_2Cu_3O_7$ 107K; $(Y_{0.5}Tm_{0.5})Ba_2Cu_3O_7$ 105K; $(Y_{0.5}Gd_{0.5})Ba_2Cu_3O_7$ 97K; $Y_2CaBa_4Cu_7O_{16}$ 97K; $Y_3Ba_4Cu_7O_{16}$ 96K; $NdBa_2Cu_3O_7$ **96**K; Y_2Ba**4**Cu_7O_{15} **95**K; $GdBa_2Cu_3O_7$ **94**K; $YBa_2Cu_3O_7$ **92**K; $TmBa_2Cu_3$**07** **90**K; $YbBa_2Cu_3$**07** **89**K; YSr_2Cu_3**07** **62**K; $GaSr_2(Ca_{0.5}Tm_{0.5})Cu_2O_7$ **99**K; $Ga_2Sr_4Y_2$CaCusO, **85**K; Ga_2Sr_4™$_2$CaCusO**5** **81**K; $La_2Ba_2CaCu_5O_9$+79K; $(Sr,Ca)_5Cu_4Oi_0$ **70**K; $GaSr_2(Ca,Y)Cu_2O_7$ **70**K; $(In_{0.3}Pb_{0.7})Sr_2(Ca_{0.8}Yo._2)Cu_2$Ox **60**K; $(La,Sr,Ca)_3Cu_2O_6$ **58**K; $La_2CaCu_2O_6$+45K; $(Eu,Ce)_2(Ba,Eu)_2Cu_3O_{10}$+43K; (Lal 0.85Sro. $_5$)CuO_4 **40**K; SrNdCuO 40K; $(La,Ba)_2CuO_4$ **35-38**K; $(Nd,Sr,Ce)_2CuO_4$ **35**K; $Pb_2(Sr,La)_2Cu_2$**06** **32**K; (Lal.$_{85}$Ba.$_{15}$)CuO_4 **30**K; MgB_2 **39**K; $Ba_{0.6}K_{04}BiO_3$ **30**K; Nb_3Ge 23.2K; Nb_3Si **19**K; Nb_3Sn 18.1K; Nb_3Al 18K; V_3Si17.1K; Ta_3Pb 17K; V_3Ga 16.8K; Nb_3Ga 14.5K; V_3In 13.9K; $PuCoGa_5$ 18.5K; NbN **16**.**1**K; and many others.

[0030] The superconducting generator **100** of FIG. **7** may further comprise a rotatable carrier **300**, wherein said at least one superconducting diamagnet **200** is mounted thereupon. A coolant **325** may be provided to the superconducting diamagnets **200** to prevent transition to the normal state through supports including circulating conduits **330**. The superconducting generator **100** further comprises a rotatable shaft **310** connected to said rotatable carrier **300**, wherein said rotatable shaft contains ducts **320** to circulate said coolant **325**. In addition to the coolant circulation **325** an insulating member **225** may surround said at least one superconducting diamagnet **200** to maintain a temperature sufficient to maintain superconductivity through proving insulation.

[0031] The superconducting generator **100** includes a magnet **120** on each core **110** that may either be a permanent magnet or an electromagnet. The magnet **120** is selected to produce a field strength below the critical field strength (saturation point) of the selected superconductor, which is about 200 gauss for a Type 2 superconductor. The superconducting generator **400** of FIG. **7** shows an embodiment of a device **400** with an arrangement of a plurality of cores **111** that allows increased electrical higher output while using a higher temperature Type 2 superconductor **200** having an Hc of 200 gauss or less wherein a plurality of ferromagnetic cores **111** are arranged in a circle, wherein said gap **115** faces inwards. A plurality of rotatable carriers **330** each having at least one superconducting diamagnet **200** is mounted thereupon in a circularly spaced fashion to allow rotation. The amount of diamagnets **200** and cores **111** present are determined by the rotational force (torque) provided to a rotatable shaft **310** connected to said plurality of rotatable carriers **330**. The plurality of ferromagnetic cores **111** are arranged in a circle forming a ring of magnetic fields **131**, wherein each of said plurality of rotatable carriers **200** rotates within said ring of magnetic fields **131** by passing through the gap **115**. The number of cores, and diamagnets are determined by the torque input, desired output, the strength of the diamagnet that determine individual field strength that directly correlates to individual coil outputs and required operating temperature.

[0032] Another embodiment of the superconducting generator **500** as shown in FIG. **6** comprises at least one rotatable ferromagnetic core **110**, **710** including a gap **115** having a magnet **120** positioned on said ferromagnetic core **110** producing a normal magnetic field **130**. A coil **140** is positioned within the field **130** on each ferromagnetic core **110**, **710**. The core **110** is rotated in relation to at least one fixed superconducting diamagnet **200** that is positioned to pass through said gap **115** on said at least one ferromagnetic core **110**, **710** when said core **110** is rotated.

[0033] The superconducting generator **600** may further comprising a positioning member **410**, wherein a plurality of superconducting diamagnets **420** are mounted thereupon in a circularly spaced fashion. A plurality of ferromagnetic cores **710** arranged in a circle forming a ring of parallel magnetic fields **720**, wherein said ring of parallel magnetic fields **720** is rotated so that said plurality of superconducting diamagnets **420** on the positioning member blocks said ring of parallel magnetic fields **720** during rotation.

[0034] The superconducting generator **600** of FIG. **6** further comprises a vessel **520** having a wall **525** that may include insulation **528** and cryogen **530** therein circulating to cool the plurality of superconducting diamagnets **200** that are mounted to extend therefrom in a circularly spaced fashion on said wall **525** of said vessel **520**. A rotatable shaft **550** is operably attached to a plurality of ferromagnetic cores **710** arranged in a circle. The plurality of cores **710** are not in physical or electrical contact so as to form a ring of parallel magnetic fields **730** that are mounted to said rotatable shaft **550**. The plurality of ferromagnetic cores **710** have said gap **115** facing outwards and is positioned within said vessel **520**

so that said diamagnets **200** on said vessel wall **525** momentarily blocks said fields **730** during rotation when passing within said gap **115**. The superconducting generator **600** may include a cryogen or cryogenic refrigeration **530** within said vessel wall **525** to chill said attached, affixed or partially embedded superconducting diamagnets **200** to allow the plurality of ferromagnetic cores **710** to be maintained at a temperature above a critical superconducting temperature.

[0035] The dewar **225** as shown in FIG. **3** may be made of glass, stainless steel or any other material that does not have magnetic or electric properties at the low required temperatures below the Tc of the superconductor **200**. The shape of the superconductor **200** within the dewar **225** can be modified to adjust the output waveform of the coil **140**. The diamagnet shape **202** may be changed to a circular shape, square, rectangular, or rod like to create a square, triangular or sinusoidal wave pattern from said EMF output of said coil **140**.

[0036] A superconducting generator **800** as shown in FIG. **8** comprises a plurality of ferromagnetic cores **810** arranged in a circle, wherein each core as shown in FIG. **1** includes a gap **115** and a magnet **120** that produces a normal magnetic field **130** within each core **110** and across the gap **115**. There is at least one coil **140** positioned within the normal magnetic field **130** on each ferromagnetic core. The plurality of cores arranged in a circle **810** may be stacked upon each other and share a common rotation shaft **820** that can be configured to rotate either the plurality of cores arranged in a circle **810** or a plurality of superconducting diamagnets **220** positioned and configured to pass through each said gap **115** on said plurality of ferromagnetic cores **810**. The rotation of the shaft **820** depending on the desired configuration allows movement of either said plurality of superconducting diamagnets **220** or plurality of ferromagnetic cores **810** with respect to each other to momentarily block the normal magnetic field **130** causing a voltage to be produced within said at least one coil **140**.

[0037] Various modifications and variations of the described apparatus and methods of the invention will be apparent to those skilled in the art without departing from the scope and spirit of the invention. Although the invention has been described in connection with specific embodiments, outlined above, it should be understood that the invention should not be unduly limited to such specific embodiments. Various changes may be made without departing from the spirit and scope of the invention as defined in the following claims.

I claim:

1. A generator comprising:

at least one ferromagnetic core including a gap;

a magnet positioned on said at least one ferromagnetic core producing a normal magnetic field within said gap;

at least one coil positioned within the normal magnetic field on said at least one ferromagnetic core;

at least one superconducting diamagnet rotatably positioned to pass through said gap on said at least one ferromagnetic core, wherein rotation of said at least one diamagnet momentarily blocks the normal magnetic field causing a voltage to be produced withing said at least one coil.

2. The generator of claim **1** further comprising:

a dewar surrounding said diamagnet, said dewar dimensioned to pass through said gap.

3. The generator of claim **1** further comprising:

a rotatable carrier, wherein said at least one diamagnet is mounted thereupon; and

a frictionless bearing mounted on said rotatable carrier.

4. The generator of claim **1** further comprising:

a rotatable shaft connected to said rotatable carrier, wherein said rotatable shaft contains ducts to circulate a cryogen.

5. The generator of claim **1** further comprising:

an insulating member surrounding said at least one diamagnet to maintain a temperature sufficient to maintain superconductivity.

6. The generator of claim **1** wherein the magnet is a permanent magnet.

7. The generator of claim **1** wherein the magnet is an electromagnet.

8. The generator of claim **1** wherein said at least one ferromagnetic core is a plurality of ferromagnetic cores arranged in a circle, wherein said gap faces inwards.

9. The generator of claim **1** further comprising:

a plurality of rotatable carriers, wherein a plurality of said at least one diamagnet is mounted thereupon in a circularly spaced fashion;

a rotatable shaft connected to said plurality of rotatable carriers; and

a plurality of ferromagnetic cores arranged in a circle forming a ring of magnetic fields, wherein each of said plurality of rotatable carriers rotates within said ring of magnetic fields within said gap.

10. A superconducting generator comprising:

at least one rotatable ferromagnetic core including a gap;

a magnet positioned on said at least one ferromagnetic core producing a normal magnetic field;

a coil positioned within the field on said at least one ferromagnetic core; and

at least one fixed superconducting diamagnet positioned to pass through said gap on said at least one ferromagnetic core when said core is rotated.

11. The superconducting generator of claim **10** further comprising:

a dewar surrounding said superconducting diamagnet, said dewar dimensioned to pass through said gap.

12. The superconducting generator of claim **10** further comprising:

a positioning member, wherein a plurality of said at least one superconducting diamagnet is mounted thereupon in a circularly spaced fashion; and

a plurality of ferromagnetic cores arranged in a circle forming a ring of parallel magnetic fields, wherein said ring of parallel magnetic fields is rotated so that said plurality of said at least one superconducting diamagnet on the positioning member blocks said ring of parallel magnetic fields during rotation.

13. The superconducting generator of claim **11** wherein said gap of said at least one rotatable ferromagnetic core faces inward.

14. The superconducting generator of claim **10** further comprising:

a vessel having a wall;

a plurality of said at least one superconducting diamagnet is mounted to extend therefrom in a circularly spaced fashion on said wall of said vessel;

a rotatable shaft; and

a plurality of ferromagnetic cores arranged in a circle and forming a ring of parallel magnetic fields that are mounted to said rotatable shaft, wherein said plurality of ferromagnetic cores have said gap facing outwards and is positioned within said vessel so that said diamagnets on said vessel wall blocks said fields during rotation.

15. The superconducting generator of claim **14** further comprising:

a fluid within said vessel wall to chill said at least one superconducting diamagnet.

16. The superconducting generator of claim **15** wherein said plurality of ferromagnetic cores is placed into a stacked configuration.

17. The superconducting generator of claim **10** wherein the diamagnet shape may be changed to create a different wave pattern from said coil.

18. A generator comprising:

a plurality of ferromagnetic cores, wherein each core includes a gap;

a magnet positioned on each of said plurality of ferromagnetic cores producing a normal magnetic field within each said core and said gap;

at least one coil positioned within the normal magnetic field on each said plurality of ferromagnetic cores;

a plurality of diamagnets positioned and configured to pass through each said gap on said plurality of ferromagnetic cores, wherein rotation of either said plurality of diamagnets or plurality of ferromagnetic cores with respect to each other momentarily blocks the normal magnetic field causing a voltage to be produced withing said at least one coil.

19. The generator of claim **18** wherein the diamagnet is selected from the group consisting of Niobium, $YBa_2Cu_3O_7$, $YBa_2Cu_4O_8$, or $Y_2Ba_4Cu_7O_{14}$.

20. The generator of claim **18** wherein said diamagnet has a shape selected from the group consisting of circular, square, polygon, rod or rectangular.

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